NASA TECH BRIEF

Manned Spacecraft Center

SINDA, Systems Improved Numerical Differencing Analyzer

The problem:

To obtain an accurate temperature profile of a large body.

The solution:

A program has been written to analyze a group of 100-node areas and then provide for a summation of any mumber of 100-node areas to obtain a temperature profile.

How it's done:

In order to properly and accurately analyze the temperature of a body it is necessary to obtain and analyze a large number of data points or nodes. It has been found that the upper limit for rapid computerization is 100 nodes. The program SINDA will handle both the analysis of a 100-node area and the summation of whatever number of 100-node areas the body may have to be divided into in order to obtain the required temperature profile.

SINDA is a highly modified version of CINDA-3G; (Reference B72-10721); the major differences being: (1) elimination of assembly language coding, (2) additional mnemonic options to aid the program user in data input, (3) inclusion of a second pseudo compute sequence for evaluation of nonlinear network elements, and (4) additional subroutines such as sensitivity analyses and Kalman filtering.

The additional mnemonic options provide for a source data block, nodal capacitance as a composite, polynomial representation of temperature varying conductors, etc.

SINDA program options offer the user a variety of methods for solution of thermal analog modes presented in a network format. The network is in one-to-one correspondence to both the physical and mathematical models. SINDA contains numerous subroutines for handling interrelated complex phenomena such as sublimation, diffuse radiation within an enclosure, simultaneous 1-D incompressible fluid flow including valving and transport delay effects, sensitivity analysis, and thermal network corrections method.

Notes:

1. This program is written in FORTRAN V and SLEUTH (UNIVAC-1108 Machine Language) for use on a UNIVAC-1108 EXEC-II computer. Six tape and/or disc units are required for operation.
2. Inquiries concerning this program should be directed to:

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